Supplementary Information

NOTES ON SUPPLEMENTARY DATA

This supplementary file contains rarefaction curves (Figures **S1–S2**), phylum-level comparisons (Figure **S3**), NMDS ordinations (Figure **S4**), Mantel networks (Figure **S5**), sample-level alpha-diversity indices (Tables **S1–S2**), and sampling-site information (Table **S3**). Summary results for microplastic abundance and composition are presented in Figures **2–3** and Table 1 of the main manuscript.

Sample identifiers: S03 and S06 denote the normal-flow (March 2025) and high-flow (June 2025) campaigns, respectively; S and MP denote the sediment environment and plastisphere samples. Alpha-diversity values are reported as provided in the project tables after quality control.

Tables **S1** and **S2** list the sample-level alpha-diversity indices for the bacterial and fungal datasets, respectively. Table **S3** lists sampling-site names, river reaches, and coordinates.

Table S1: Sample-Level Alpha-Diversity Indices for Bacterial Communities (n = 42)

Sample ID	Habitat	Sobs	Chao1	ACE	Pielou_e	Shannon	Simpson	Coverage
S03_1	Sediment	5572.0	8700.33	11074.8	0.81	6.99	0.0	0.94
S03_2	Sediment	5125.0	8163.71	10172.43	0.81	6.91	0.0	0.95
S03_3	Sediment	6108.0	9104.01	11195.6	0.83	7.26	0.0	0.94
S03_4	Sediment	5502.0	7787.56	8159.6	0.83	7.13	0.0	0.95
S03_5	Sediment	5328.0	7773.66	8016.0	0.84	7.2	0.0	0.95
S03_6	Sediment	5020.0	7156.16	7388.21	0.8	6.86	0.01	0.95
S03_7	Sediment	4805.0	6947.68	7074.06	0.82	6.96	0.0	0.96
S03_8	Sediment	5618.0	7565.04	7890.98	0.85	7.36	0.0	0.95
S03_9	Sediment	2161.0	2518.04	2553.36	0.78	5.97	0.01	0.99
S03_10	Sediment	4771.0	7005.28	8729.14	0.81	6.86	0.0	0.95
S06_1	Sediment	5363.0	7624.63	8101.8	0.81	6.99	0.0	0.95
S06_2	Sediment	5009.0	6760.22	6983.15	0.83	7.11	0.0	0.96
S06_3	Sediment	5540.0	8048.85	8307.71	0.83	7.14	0.0	0.95
S06_4	Sediment	4873.0	5858.47	6074.05	0.84	7.14	0.0	0.97
S06_5	Sediment	5836.0	8426.61	8791.4	0.84	7.24	0.0	0.94
S06_6	Sediment	4516.0	6347.22	6628.78	0.78	6.53	0.01	0.96
S06_7	Sediment	4947.0	6376.63	6537.57	0.85	7.26	0.0	0.96
S06_8	Sediment	4337.0	5797.2	5936.19	0.8	6.74	0.0	0.96
S06_9	Sediment	4624.0	6531.32	6828.05	0.8	6.74	0.01	0.96
S06_10	Sediment	4704.0	6568.62	6794.85	0.82	6.93	0.0	0.96
S06_11	Sediment	1563.0	1918.23	1991.84	0.64	4.73	0.03	0.99

(Table S1 continued)

Sample ID	Habitat	Sobs	Chao1	ACE	Pielou_e	Shannon	Simpson	Coverage
MP03_1	Plastisphere	3250.0	4770.83	5246.49	0.59	4.78	0.09	0.97
MP03_2	Plastisphere	3971.0	5876.88	6255.24	0.67	5.56	0.04	0.96

MP03_3	Plastisphere	4542.0	6679.98	8130.46	0.79	6.67	0.01	0.96
MP03_4	Plastisphere	4859.0	6235.58	6492.67	0.8	6.79	0.01	0.96
MP03_5	Plastisphere	6489.0	8186.65	8427.81	0.88	7.75	0.0	0.95
MP03_6	Plastisphere	1438.0	1541.84	1499.89	0.84	6.11	0.01	1.0
MP03_7	Plastisphere	3148.0	4457.58	4682.49	0.7	5.62	0.02	0.97
MP03_8	Plastisphere	3011.0	3759.12	3829.04	0.71	5.67	0.02	0.98
MP03_9	Plastisphere	3736.0	4717.6	4873.89	0.81	6.65	0.01	0.97
MP03_10	Plastisphere	5988.0	8293.03	8695.88	0.84	7.33	0.0	0.95
MP06_1	Plastisphere	5845.0	8250.74	8557.04	0.83	7.23	0.0	0.95
MP06_2	Plastisphere	4211.0	5030.51	5105.75	0.84	6.99	0.0	0.97
MP06_3	Plastisphere	3735.0	4409.62	4362.1	0.83	6.84	0.01	0.98
MP06_4	Plastisphere	526.0	549.43	549.01	0.78	4.91	0.02	1.0
MP06_5	Plastisphere	5546.0	7498.55	7732.66	0.84	7.26	0.0	0.95
MP06_6	Plastisphere	1311.0	2182.14	2737.89	0.48	3.48	0.13	0.99
MP06_7	Plastisphere	2620.0	2824.06	2770.77	0.89	6.97	0.0	0.99
MP06_8	Plastisphere	2209.0	2511.83	2491.16	0.78	5.99	0.01	0.99
MP06_9	Plastisphere	1816.0	2415.37	2457.4	0.73	5.46	0.01	0.99
MP06_10	Plastisphere	5253.0	7520.27	7860.22	0.83	7.15	0.0	0.95
MP06_11	Plastisphere	1200.0	1279.93	1259.65	0.84	5.95	0.01	1.0

Values are sample-level estimates. Sobs, observed OTU richness; Chao1 and ACE, richness estimators; Pielou_e, Pielou's evenness; Shannon and Simpson, diversity indices; Coverage, sequencing coverage.

Table S2: Sample-Level Alpha-Diversity Indices for Fungal Communities (n = 39)

Sample ID	Habitat	Sobs	Chao1	ACE	Pielou_e	Shannon	Simpson	Coverage
S03_1	Sediment	1605.0	1717.6	1716.54	0.72	5.28	0.03	1.0
S03_2	Sediment	767.0	791.02	787.7	0.75	5.0	0.03	1.0
S03_3	Sediment	1325.0	1416.09	1416.0	0.72	5.15	0.02	1.0
S03_4	Sediment	705.0	722.1	719.4	0.86	5.62	0.01	1.0
S03_5	Sediment	1567.0	1800.99	1793.82	0.68	4.97	0.04	0.99
S03_6	Sediment	1088.0	1167.69	1151.82	0.72	5.06	0.02	1.0
S03_7	Sediment	1420.0	1504.02	1502.6	0.68	4.93	0.06	1.0
S03_8	Sediment	279.0	280.0	281.1	0.77	4.31	0.05	1.0
S03_9	Sediment	60.0	60.0	60.44	0.59	2.41	0.17	1.0
S03_10	Sediment	1548.0	1656.51	1659.53	0.72	5.28	0.02	1.0
S06_1	Sediment	1346.0	1438.98	1423.51	0.66	4.72	0.06	1.0
S06_2	Sediment	584.0	591.91	592.32	0.74	4.7	0.04	1.0
S06_3	Sediment	517.0	543.46	535.57	0.69	4.29	0.08	1.0
S06_4	Sediment	266.0	271.0	272.92	0.85	4.72	0.02	1.0
S06_5	Sediment	1053.0	1172.49	1180.33	0.49	3.44	0.15	1.0
S06_6	Sediment	638.0	658.63	659.4	0.74	4.78	0.03	1.0
S06_7	Sediment	186.0	189.5	189.23	0.64	3.35	0.08	1.0
S06_8	Sediment	191.0	193.0	193.45	0.74	3.9	0.05	1.0
S06_9	Sediment	947.0	981.69	976.23	0.7	4.77	0.03	1.0
S06_10	Sediment	935.0	969.38	961.29	0.8	5.45	0.01	1.0
S06_11	Sediment	74.0	81.5	77.98	0.59	2.54	0.19	1.0

(Table S2 continued)

Sample ID	Habitat	Sobs	Chao1	ACE	Pielou_e	Shannon	Simpson	Coverage
MP03_1	Plastisphere	470.0	552.19	548.22	0.29	1.8	0.38	1.0
MP03_3	Plastisphere	426.0	444.75	435.98	0.64	3.89	0.09	1.0
MP03_4	Plastisphere	188.0	188.6	189.28	0.79	4.15	0.04	1.0
MP03_5	Plastisphere	204.0	221.5	233.25	0.87	4.64	0.02	1.0
MP03_6	Plastisphere	26.0	26.0	26.44	0.81	2.63	0.09	1.0
MP03_8	Plastisphere	81.0	82.0	83.26	0.8	3.51	0.05	1.0
MP03_9	Plastisphere	72.0	72.33	72.79	0.42	1.81	0.41	1.0
MP03_10	Plastisphere	437.0	455.07	449.46	0.84	5.09	0.01	1.0
MP06_1	Plastisphere	254.0	263.1	264.66	0.78	4.31	0.05	1.0
MP06_2	Plastisphere	155.0	156.25	157.43	0.61	3.07	0.14	1.0
MP06_3	Plastisphere	53.0	53.0	53.57	0.59	2.32	0.2	1.0
MP06_4	Plastisphere	16.0	17.0	0.0	0.8	2.2	0.12	1.0
MP06_5	Plastisphere	154.0	156.63	158.15	0.78	3.93	0.05	1.0
MP06_6	Plastisphere	428.0	458.52	453.42	0.68	4.12	0.04	1.0
MP06_7	Plastisphere	16.0	16.0	16.0	0.18	0.5	0.83	1.0
MP06_8	Plastisphere	54.0	58.67	84.74	0.44	1.77	0.43	1.0
MP06_10	Plastisphere	206.0	211.5	214.56	0.83	4.44	0.03	1.0
MP06_11	Plastisphere	15.0	15.0	15.0	0.65	1.75	0.24	1.0

Values are sample-level estimates. Sobs, observed OTU richness; Chao1 and ACE, richness estimators; Pielou_e, Pielou's evenness; Shannon and Simpson, diversity indices; Coverage, sequencing coverage.

Table S3: Names, River Reaches, and Geographic Coordinates of the 11 Sampling sites in the Qinhuai River Basin

Site	Site name	Reach	River or tributary	Longitude (°E)	Latitude (°N)
1	Zhangfucang East	Upper	Jurong River	119.0653	31.9756
2	Upper Jurong River	Upper	Jurong River	119.1805	31.9434
3	Tuqiao	Upper	Jurong River	119.0728	31.8638
4	Upstream of the Nanhe River confluence	Upper	Jurong River	119.1164	31.8213
5	Kaitai Bridge	Upper	Lishui River	119.0142	31.7597
6	Middle reach of the Yigan River	Upper	Lishui River	118.9440	31.7049
7	Wusha Bridge	Upper	Lishui River	118.8965	31.7693
8	Yangqiao	Middle	Qinhuai River	118.8595	31.8730
9	Niushoushan River confluence	Middle	Qinhuai River	118.8351	31.9354
10	Sancha River mouth	Lower	Outer Qinhuai River	118.7354	32.0742
11	Jiangjun Avenue Bridge	Lower	Qinhuai New River	118.7799	31.9576

Site numbers correspond to Figs. 1–3 in the manuscript. Coordinates are expressed in decimal degrees. Reach indicates the position within the Qinhuai River Basin.

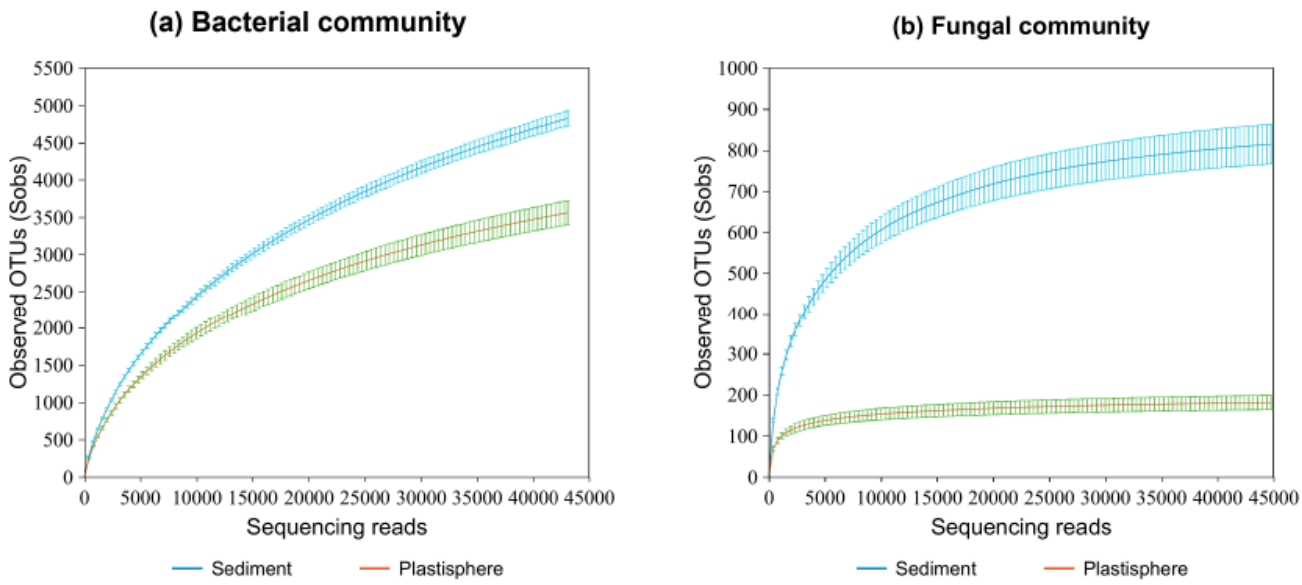


Figure S1: Rarefaction curves of observed OTU richness (Sobs) for (**a**) bacterial communities and (**b**) fungal communities. Curves show richness as a function of sequencing depth for sediment and plastisphere samples.

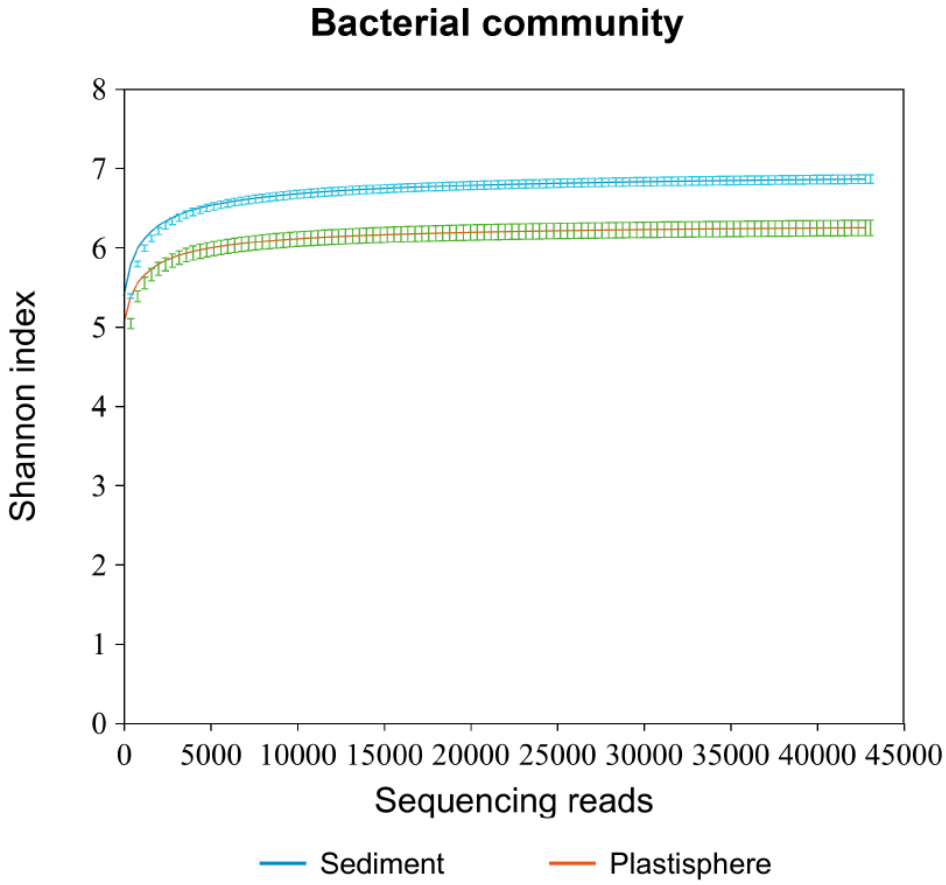


Figure S2: Shannon rarefaction curves for bacterial communities in sediment and the plastisphere. Curves show the Shannon index as a function of sequencing depth.

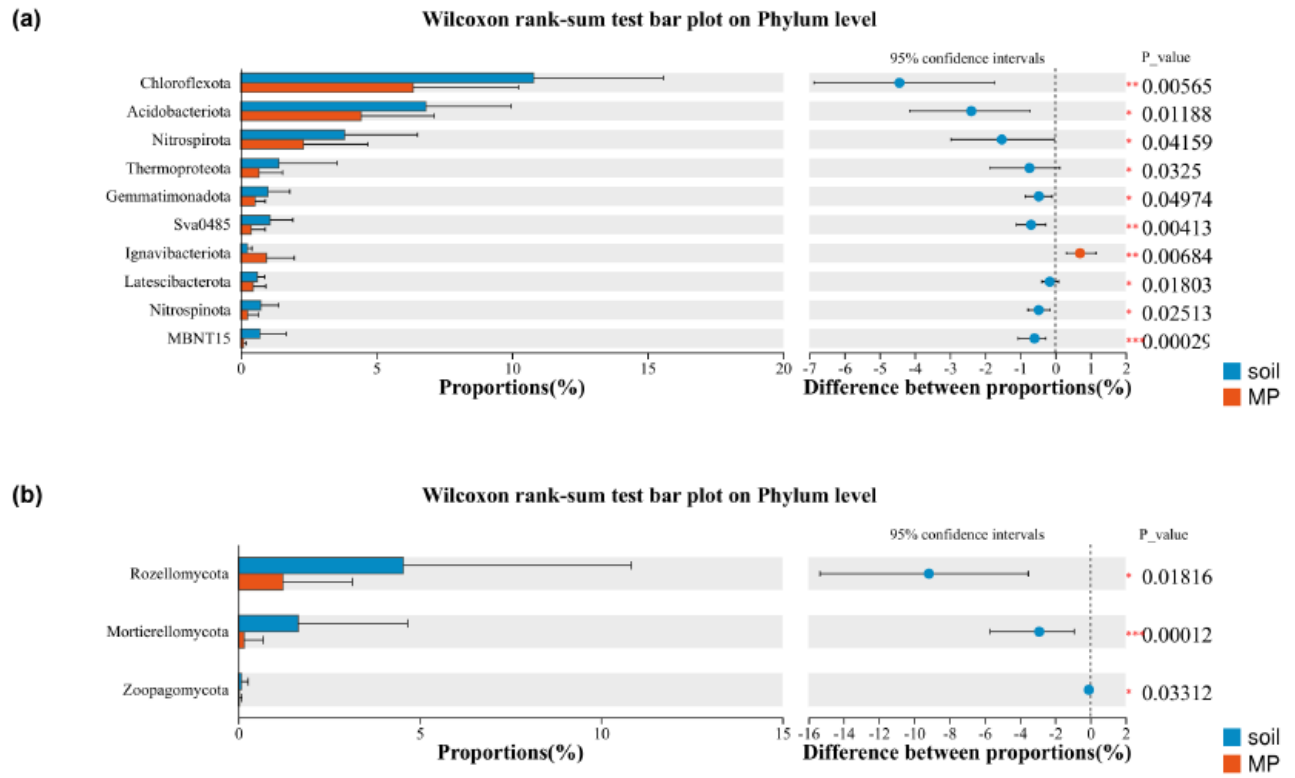


Figure S3: Phylum-level differences in relative abundance between sediment and the plastisphere. (**a**) 16S-detected taxa; (**b**) fungal taxa. Left panels show relative abundances; right panels show differences (plastisphere minus sediment) with 95% confidence intervals. *p* values are from Wilcoxon rank-sum tests: * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$. soil, sediment environment; MP, plastisphere.

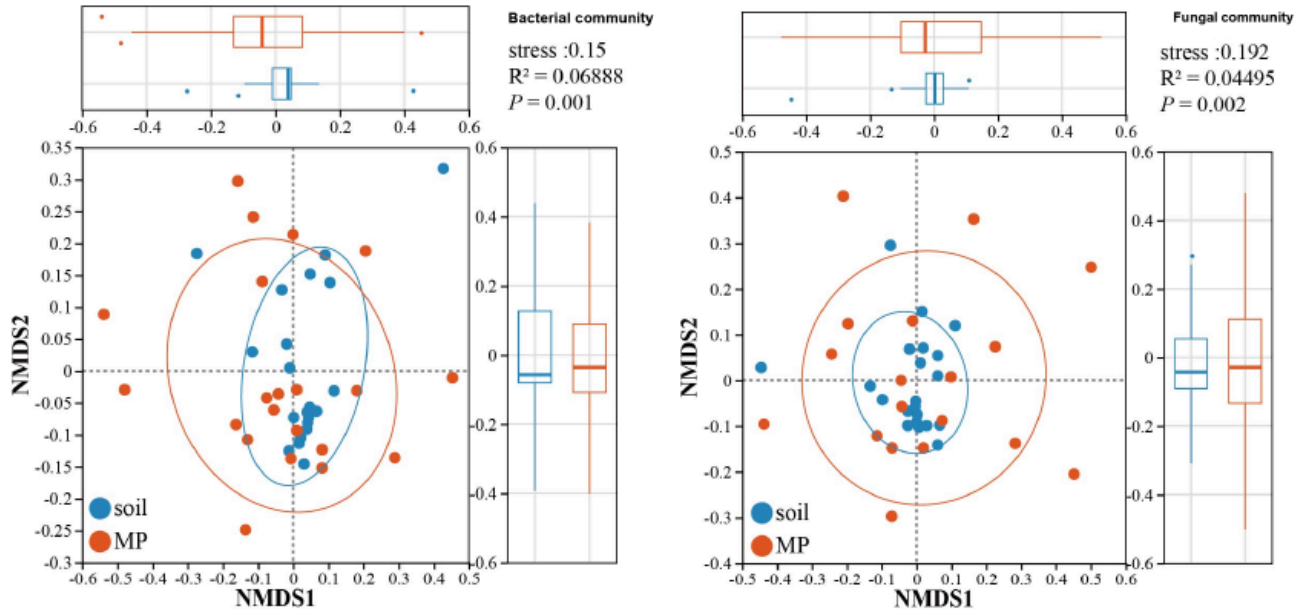


Figure S4: Non-metric multidimensional scaling (NMDS) based on Bray–Curtis dissimilarity of bacterial communities (left) and fungal communities (right). Points represent samples, and marginal boxplots summarize their ordination scores. Stress values describe the NMDS fit; R^2 and *p* values are from permutational multivariate analysis of variance (PERMANOVA). soil, sediment environment; MP, plastisphere.

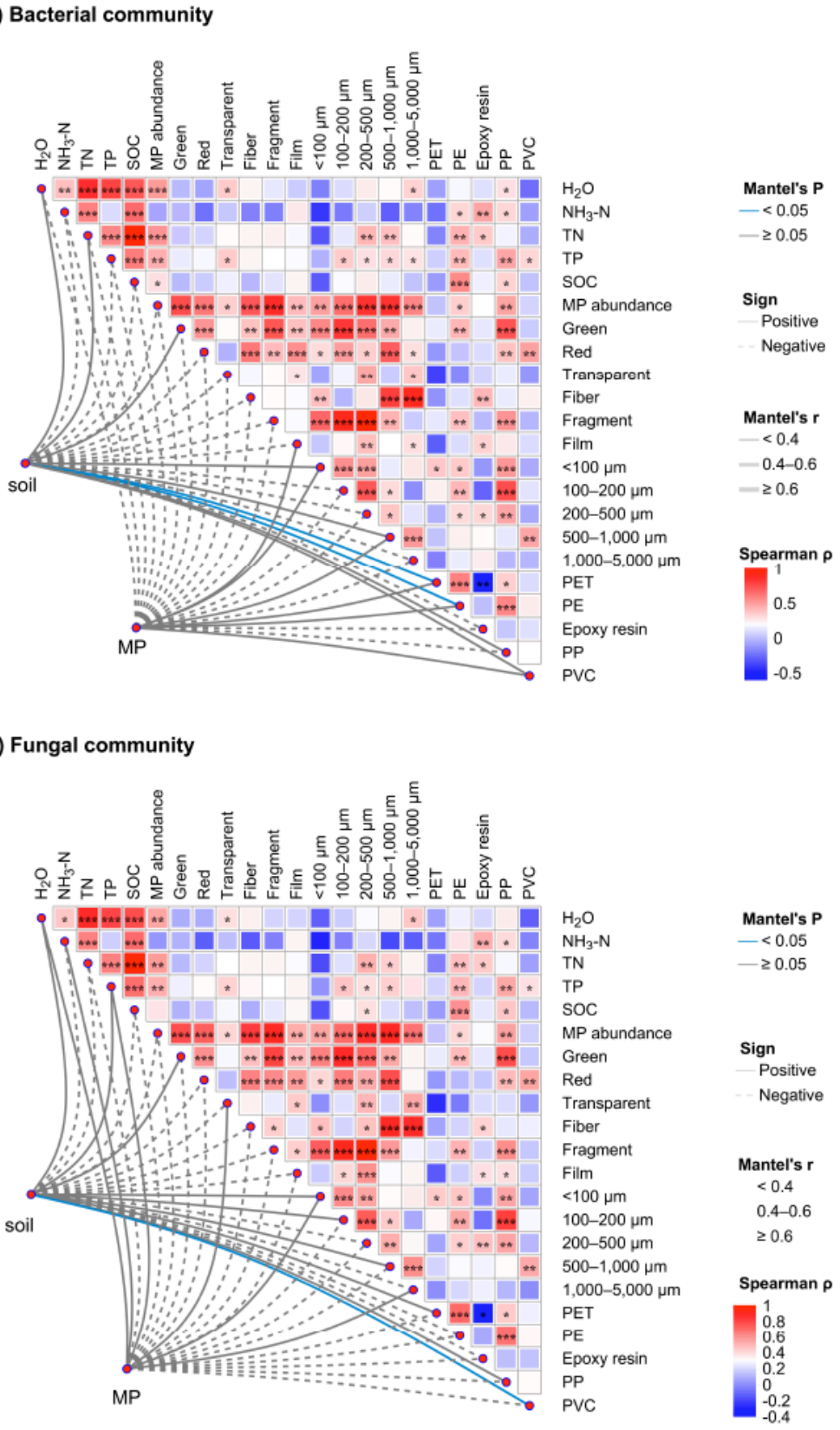


Figure S5: Mantel networks linking genus-level community composition to sediment environmental variables and microplastic characteristics. (**a**) Bacterial communities; (**b**) fungal communities. Heatmap colors represent pairwise Spearman correlations among the measured variables; asterisks mark significant correlations. Connections represent Mantel tests between community dissimilarity and individual variables. Line color indicates the *p*-value category, line type indicates the sign, and line width indicates the Mantel r category. soil, sediment; MP, plastisphere. H_2O, water content; NH_3-N, ammonia nitrogen; TN, total nitrogen; TP, total phosphorus; SOC, organic carbon.